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THE ACADEMICIAN.

NO XX.

Continued from page 279.

No. —

και καλὸς ἀριστος.

Pindar Olymp. O. 13.

"This is the season for the right understanding of the subject which is before us."

Αγαθὸς ἀγαθὸς ἀντιζητῶν.

Dion. Halicarn.

"To examine the excellent with the excellent, and compare their several merits with each other."

It is not sufficient that a word is found, unless it be so combined as that its meaning is apparently determined by the tract and tenour of the sentence.

Dr. Johnson.

From the examples and remarks in the two preceding numbers, we trust, our readers will be enabled to recognize our method of teaching the elements of language.

Much has been said upon the subject, that the meaning of words is more easily acquired by spelling them abstractly, than they can be, by combination. We are, however, convinced from long experience and the examination of the writings of the most erudite scholars, that such a principle is altogether fallacious, and that elementary books composed, or the systems built by teachers on that ground, will before long, dwindle into insignificance. We trust, and we know, that the process of teaching children to write what another dictates; or to combine letters into words without a knowledge of the signification of those words, although, one of the most popular systems of instruction of the present day is reared upon it, and, which has received more than its due share of praise, will fall into a just oblivion, to which its absurdities condemn it. A method like this, calculated to teach mere spelling, and the repetition of sentences, without understanding them, may (as some suppose) answer for children, whose parents cannot afford to give them an education which shall call into action all the energies of the mind. But since it is allowed, that one lesson learnt *understandingly*, is worth fifty learnt *parrot like, or by heart*, we are of opinion, which is supported by the voice of the learned in every country, that a *better, a more solid, a more durable* method may be laid down, than that of which we are speaking. If a system adopted, as a national system, have no further merit, than to make youth *repeaters* of others' thoughts, and *not thinkers*, we are sure no one will deny, that such a system is bad, or,

that it does not deserve the attention of the public. Repetition, or remembrance of facts without the exercise of judgment, will neither teach men to understand their rights nor advance in science; because the former is involved in political perplexity, and the latter presupposes a combination of the energies of the intellect, improved, strengthened and capacitated to think correctly.

We make not these remarks to invalidate the system of any particular individual, but as condemnatory of any system founded on that principle, which we consider as wholly erroneous, and as deriving support only, from those who have reflected little on the subject, or from the credulity of ignorance. By theories engendered in the closet, experiment is confounded, and the advancement of education and science retarded, or, perhaps, more properly speaking, are made to retrograde. Out of the multiplicity and jarring modes of instruction now extant, it is difficult to select one exactly congenial to the developement of the powers of the human mind. Among the most philosophic and natural of any we have seen, (and from which, as well as from all the others with which we have become acquainted, together with our own experience, we have formed the one we are pursuing in our own school,) is Pestalozzi's. It is based on the Abbé Condillac's principles of logic. It is the substance of that acted upon by the Greeks and Romans, but which has been confined in the interior of Europe for centuries. Even in the dark ages, when learning was nearly extinct, the reliques of this mode of education, the wandering descendants of those immortal nations, retained in their method of teaching their offspring, the necessary professions which existed among them. In Germany and in France, nay, even in England, Ireland and Scotland, it has been revived, is now in full operation, and is eliciting the same energies of mind, and producing consequences, equal to the causes. Pestalozzi, though but little known as yet in this country, will, we predict, before half a century, be held in sacred remembrance by every lover of science in the western hemisphere. While Bell and the inventors of other systems, adhere generally to mere forms, Pestalozzi operates immediately on the mind. *Forms* should always be secondary to *mode and matter*. The former are *imitative* and *passive*; the latter is not only an *imitative*, but a *thinking* system, and is such a one as is congenial with the habits of the American people.\*

\* The following extract from the report of the British and Foreign School Society for 1818, is corroborative of our opinion, that neither Mr. Lancaster nor the teach-



Upon the subject of learning the meaning of words abstractly, we would ask, was it in this manner alone, or was it by noticing their force and meaning when combined in sentences, that the goliath of literature, Dr. Johnson, was capable of making those nice discriminations between words apparently synonymous, and thus, of giving to the world his dictionary, one of the noblest monuments of philology and philosophic acumen, of which the English language can boast? or was it by considering words abstractly, that Pope, Addison, Beattie, Campbell, and others, were enabled to use them according to their true signification? we answer no, and those

ers of the parent institution in London, have arrived at the *acme* of perfection in the system of instruction which they pronounce superior to all others. It is evident, that time and experience have convinced them, that improvements may be made, although some of our own countrymen have asserted in the most positive terms that the system was perfect. We are glad, however, to see that the rational system of Pestalozzi, is about to be engrafted on the British system, and we should not be surprised to see in the next annual report, that the system will have received from the adoption of this mode of instruction, an accession, out weighing in the scale of utility all the vagrant notions of perfectability in the system of passive instruction which necessarily result from the dictating method.

"Though the system" (say the committee) "for the *POOREST CLASSES* of society, has now proved itself more efficient than any other, both as regards the expense of tuition and the rapidity with which it may be conveyed, yet, your committee are aware that further improvements are still possible. They are convinced that the utmost perfection of education can only be attained where the disposition and habits of every individual child can be accurately studied; his whole conduct in every part of the day watched over by an enlightened and well instructed *tutor*, who should seize every opportunity to mould the mind of his pupil to virtue, and avail himself of every *passing circumstance* to inculcate a lesson of instruction. Such are the plans of Pestalozzi and Fellenburg: but they are chiefly calculated for private families in easy circumstances, and for the middle and upper ranks of society. Our concern is with the million; and here the question is only what is practicable. We are yet far, very far, from having obtained the pecuniary means necessary for giving any education to a large part of our population, but, still, wherever an improvement can be suggested which shall not materially increase the expense, your committee will be most desirous to give it a trial; and for this purpose, another sub-committee has been appointed, to which all these subjects are referred, and which, having paid considerable attention to the *improvement* of the Reading lessons and arithmetic, is now occupied with the consideration of the kind of books which may be generally recommended for school libraries, to be lent out to those pupils who may have distinguished themselves by their general good conduct. The sub-committee also find that some of the methods of Pestalozzi and of the Abbé Gaultier may be adopted with great advantage, at a very trifling expense, and your committee hope that, by the next anniversary, they shall be able to report satis-

who pretend to doubt, had better consult the nature of language, before they make their doubts public. On this subject a celebrated Philologist says, "In order to analyze the difference in meaning of words apparently synonymous, and the difference of which could only be seen by analysis, I have been guided in the choice of authorities by various considerations; namely, the appropriateness of examples; the classic purity of the author; the justness of the sentiment, and last of all, the variety of the writers; but I am persuaded that the reader will not be dissatisfied to find that I have shown a decided preference to such authors as Addison, Johnson, Dryden, Pope, and Milton," who were well acquainted with the nice distinctions and the powers of words, which we presume to say, were not acquired by learning them abstractly.

The power of a word is never shown when it stands abstractly. We might as well undertake to teach the terms of grammar by this means as the power of words; and we think, it would require more than a common share of patience and intellectual acumen to make a child know what an adjective, a verb, or a pronoun is, unless their nature should be elucidated by exemplifications and oral explanations.

That we are not single on this point, that the method for which we contend, is correct, of teaching youth to learn *ideas* when they learn *words*, to see the different meanings of words according, to their disposition or collocation in sentences; in a word, all that we have mentioned, and against which, there may be among sciolists, and those educated on the old system, a hostility; we think will be clearly evinced by the following able remarks of that celebrated and acute metaphysician, Dugald Stewart.

In the midst of his profound and admirable speculations he has touched upon a subject which could scarcely fail to suggest itself to such a mind upon such an occasion;—namely, the extreme imperfection of teaching language, even in its most improved state, and the vast *supplements* that are required to be made by the understanding to that which is most fully and perspicuously expressed.

We speak, says he, of communicating, by means of words, our ideas and feelings to others: and we seldom reflect sufficiently on the latitude with which this metaphorical phrase ought to be understood. The truth is, that, even in conversing on the plainest and most familiar subjects, however full and circumstantial our statement may be, the words which we employ, if examined with accuracy, will be found to do nothing more than to suggest *hints* to our hearers, leaving by far the principal part of the process of interpretation to be performed by the mind itself. In this respect, the effect of *words* bears some resemblance to the stimulus given to the memory and imagination, by an outline or a *shadow*, exhibiting the profile of a countenance familiar to the senses.



The most minute narratives, accordingly, are by no means, in every instance, the most intelligible and satisfactory; and the most faithful copies after nature, do not always form the best portraits. In both cases, the skill of the artist consists in a happy selection of particulars which are *expressive* and *significant*.

In reading, for example, the enunciation of a proposition, we are apt to fancy, that for every word contained in it, there is an *idea* presented to the understanding; from the combination and comparison of which *ideas* result that act of the mind, called *judgment*. So different is all this from the fact, that our words, when examined separately, are often as completely insignificant as the letters of which they are composed; deriving their meaning solely, from the connection, or relation, in which they stand to others. Of this, a very obvious example occurs, in the case of terms which have a *variety* of acceptations, and of which the import, in every particular application, must be collected from the whole sentence of which they form a part.

A still more palpable illustration of the same remark presents itself, when the language we listen to, admits of such transpositions in the arrangement of words, as we often meet with in the writings of our best authors. In such cases, the artificial structure of the discourse suspends, in a great measure, our conjecture about the sense, till at the close of the period, the *verb* in the very instant of its utterance, unriddles the *enigma*. Previous to this, the former words and phrases resemble those detached and unmeaning patches of different colours, which compose what opticians call *anamorphosis*; while the effect of the *verb* and the end, may be compared to that of the mirror by which the *anamorphosis* is reformed, and which combines these apparently fortuitous materials into a beautiful portrait or landscape. These remarks apply to all cases in which language is used; but, when the subject treated of involves notions that are complex or abstract, the defects of the instrument are infinitely greater.

In reading, accordingly, the most perspicuous discussions, in which such notions form the subject of the argument, little instruction is received, till we have made the reasoning as it were *our own*, by revolving the steps again and again in our thoughts. The fact is, that, in cases of this sort, the function of language is not so much to convey knowledge from one mind to another; as to bring two minds into the *same train of thinking*; and to confine them, as nearly as possible, to the same track.—Many authors have spoken of the wonderful *mechanism of speech*; but none has, hitherto, attended to the far more wonderful *mechanism* which it puts into action behind the scene.\*

\* In other parts of our work, we have had occasion to notice the prevailing erroneous methods of teaching the nature of language in our schools. Our youth, with few

It is further to be observed, says Mr. Stewart, that the meaning of many words of which it is impossible to exhibit any sensible prototype, is generally collected by a species of *induction*, which is more or less successfully conducted by different individuals, according to the degree of their attention and judgment. The connexion in which an unknown term stands in relation to the other words combined with it in the same sentence, often affords a key for its explanation in that particular instance, and, in proportion as such instances are multiplied in the writing and conversation of men well acquainted with the propriety of speech, the means are afforded of a progressive approximation towards its precise import. A familiar illustration of this process, presents itself in the expedient which a reader naturally employs for deciphering the meaning of an unknown word in a foreign language, when he happens not to have a dictionary at hand. The first sentence where the word occurs, affords, it is probable, sufficient foundation for a vague conjecture concerning the notion annexed to it by the author; some idea or other being necessarily substituted in its place, in order to make the passage at all intelligible. The next sentence where it is involved, renders the conjecture a little more definite; a third sentence contracts the field of doubt within still narrower limits; till, at length, a more extensive induction fixes completely the signification we are in quest of. There cannot be a doubt, we apprehend, that it is in some such way as this, that children slowly and imperceptibly enter into the abstract and complex notions annexed to numberless words in their mother tongue, of which we should find it difficult or impossible to convey the sense by formal definition.

We must add, as a farther confirmation of this exposition, that it is by a process, exactly analogous, that words of this description are taught to the deaf

exceptions are *trammelled* down to seven years servitude in repeating sounds, but they attach no more meaning to the words they repeat, than they do to *a, b, c*; but such are the ignorant and inconsistent ideas of too many of our teachers, parents and school committees, that they do not or will not see any difference between repeating the letters as in spelling, and reading understandingly. Even in our better schools, we have some of this class; but they will ere long sink into the shade of the twelve, fifteen and forty eight lesson men, and be compelled to take a trip to some obscure village where perhaps they may, for a time, live upon the credulous but honest yeomanry; but when their frands become too glaring, they must decamp carrying the contents of the injured citizens with them. We have seen the most daring attempts to bias the judgment, even of our LITERATI, in favour of this species of literary *peculation*, but we are rejoiced to learn, that men at the head of our literature, and the community at large, have taken a strong stand against those impostors, and have declared, by neglecting them, that they must abandon all their flimsy systems, adopt such as experience and common sense have tested, and be industrious, exemplary, and honest, or, starve.



and dumb, by the instructors who have carried that humane and astonishing art to a high degree of perfection.

Viewing as we do, the importance of this principle, we hope to see it universally introduced into our schools.—We believe, and we have reasons for believing it, that when this method of instruction, is clearly understood, and practically and correctly acted upon, a new era in the means of developing the faculties of the mind will be commenced, and human beings benefited more by it, than by any other method yet devised. It is so perfectly natural and so extensive in its application, that it requires but little illustration to render it intelligible to every rational being, and of the highest utility to the young and rising hopes of our growing and flourishing country.

And here we would ask, what is the object of mental education? we answer in the words of a most excellent writer on the physiology and pathology of the human mind. It has, says this author, for its object, the improvement of the human mind,\* which consists in *strengthening and rendering its various faculties more perfect, and, in acquiring a management over the passions.* It is seldom, however, that the attention of youth is directed to such a number of objects (or that correct methods are pursued,) as are necessary to the formation of men of this description. Of those, who according to the prevailing notions of this country, receive the best education, how few are there, who arrive at that eminence, which exhibits the effects of a regular and well-conducted culture both of body and mind. During the early part of life, when all the faculties of the mind ought to be equally strengthened, does it not but too frequently happen, that a boy is kept for many years together to the irksome task of loading his memory with a vocabulary of *mere words*; (or by learning books through by heart, without understanding them) and that the active faculties of his soul for the want of proper exercise, become inert, and are at last incapable of being exerted on subjects of abstract thought without pain? Of the prodigies of early learning, how few of those who preserve their health, arrive at any great eminence in the paths of science. A boy frequently becomes learned at the expense of common-sense, and now and then

at that of his judgment.† It is, indeed, a melancholy reflection, that many young people who, previously to what is called education, appear to be endowed with the finest minds and who exhibit a quickness of apprehension and a docility\* under tuition, which would secure an easy conquest in the pursuits of fame, if they were managed with sufficient skill, either fall early victims to mental fatigue, or else acquire a great disgust for instruction, merely because the proper stimuli for captivating their attention have not been found out in time. We dare not enlarge on the subject, without going beyond the limits prescribed to our essay.

We have adduced these observations, to show, and they might be confirmed by every one who has touched upon the subject, that it is destructive to mental improvement, to make children learn by heart *mere sounds*; that such a process will never teach them to understand the science of language, and of course that it should be excluded from all places of learning, and another and a better be introduced. We have endeavoured, to lay before the public the outlines we pursue, in teaching the nature of words and their uses; of their syntax we shall speak in another place. We say, we have given only the outlines of our plan, because, hints are only necessary for skilful instructors, and to say what we could upon the subject, would require two or three volumes to contain.

To be Continued.

*These things please us when we compare them with the boy's age; then improvement stands still, and admiration gradually decreases.*

*"We are apt to reckon those children the sprightliest who talk the most; and, as it is not easy for them to think and talk at the same time, the natural effect of their too much talking is too little thinking."*

Dr. Beattie.

*"Nothing is more difficult than to distinguish in children real dulness, and want of capacity, from that seeming and deceitful dulness, which is the sign of a profound genius."*

ROUSSEAU.

*"I do not wish a boy to have a maturity of understanding unnaturally early."—We may say in the well known words of an ancient, SAT CITO SI SAT BENE; soon enough, of well enough.*

Dr. Knox.

*We have observed that neither vivacity, loquacity, or mischievous tricks, or vice, is the presage of genius. Foolish parents are apt to think so, and to admire them in their children. We have often seen children who were not given to any of these, and who have been considered uncommonly stupid, turn out excellent scholars.*

EDRS.

Many more authorities might be adduced, but we have not room.

\* The marks of a proper disposition for a scholar are these, according to Socrates, in Plato de Repub-

\* See an inquiry into the nature and origin of mental derangement, comprehending a concise system of the physiology and pathology of the human mind, by Alexander Crichton, M. D.—pages 264 and 266, Vol. I.

† The following notes, copied from an able writer, we hope will be instructive to the English as well as classical scholar.

*Illud ingeniorum velut precox genus non pervenit ad frugem. Placent hæc annis comparata, deinde stat profectus, admiratio decrescit.*

QUINTILIAN.

*That early ripe kind of understanding does not come to much.*



*Outlines of Philosophical Education abstracted from  
Dr. Jardine, of Glasgow University.*

INTRODUCTORY.

IN modern times, numerous treatises have been written, both in our own and in foreign languages, on the subject of education. No one of these works, however, able and judicious as some of them undoubtedly are, deserves to be implicitly followed as a guide, in a matter confessedly so important; for no one of them comprehends, in its details, the various topics which ought to be introduced in a system of philosophic education, nor sets forth these still more essential duties of the teacher, which consist in adapting his instruction to the opening capacity of his pupils; in supplying them with constant and suitable employment; and in conducting them gradually from things more easy to things more difficult, in the natural order of the sciences. The truth, indeed, seems to be, that a systematic exposition of the different methods of teaching, considered merely as ancient, rather than as a practical and progressive scheme, for directing the efforts of those who are just entering upon the study of the sciences, has occupied the attention, and exhausted the ingenuity, of the more eminent among the writers to whom we have now alluded. There appears to be still wanting a regular elementary system of scholastic or academical study; which, uniting speculation with practice, principles and rules with suitable illustrations and exercises, would embrace the means which seem best calculated to call forth and strengthen the intellectual powers of youth. It is of less moment, perhaps, from what branches of science or of art the materials, constituting such a system, should be drawn; provided they be carefully adapted to the actual state of information in which the pupils, generally speaking, are found, at the commencement of the course of instruction, and agreeing in their tendency to create habits of diligence, and of independent exertion. Were it, indeed, the main object of the teacher, in the first lessons of instruction, to expound the doctrines of any art or science, there can be no doubt that his instructions ought to be restricted to that particular end; and the shortest and clearest explanations, which he could devise, would best serve his purpose. But, as that is only a very

*liica. Hem ust be, ευρης, μνημων, φιλομαθης, φιλοπυρος, φιλοχρος, ζητητικος, φιλοτακτικος.—Of a kindly nature, of a good memory, fond of learning fond of labour, fond of hearing, inquisitive and a lover of praise. But, says, Dr. Knox, we know not how to ascertain, in a very young child, the infallible signs of these qualities.*

\* We are glad to have it in our power to present to our readers the following remarks from the elaborate and useful work of Dr. Jardine. We are indebted to the learned Dr. SAMUEL L. MITCHILL, the great patron of literature and science, for the perusal of the above work, of which we had often heard, but could never obtain till now.

subordinate part of his aim, and, as his leading object is not so much to convey information as to stimulate industry and to cultivate the natural abilities of his pupils, he justly considers himself at liberty to make choice of his materials from the wide range of the sciences and arts, as bound by no other rule, in the use of them, than that of making them all bear, more or less directly, upon the point which he wishes to accomplish.

The variety of subjects introduced into the course of oral instruction or lecture, is more likely to attract the attention of young persons of different dispositions, talents and habits, than if the lectures were of more systematic and homogenous character; and, when the command of attention is once secured, and habits of application once thoroughly formed, it is comparatively easy to transfer them from one subject to another. Besides, how various soever the subjects may be, it is always understood that they should be connected, not only by the general aim of the teacher, but by the relations which subsist among themselves; and above all, that they should be so arranged as to conduct the pupil, step by step, as well through the more limited field of knowledge with which he is to be made actually acquainted, as into the more extensive range which leads to greater attainments. The method of teaching by geometrical demonstration is, without doubt, the most perfect of all modes of communicating science; and, in proportion as the principles of that method are adhered to, in constructing a scheme of elementary education, so much more complete and successful will it be in practice.

It is by no means pretended that the mode of instruction, we here introduce is the best, or the most appropriate, that could have been devised.—Many valuable additions and changes might probably be suggested; and yet, imperfect and deficient as it may appear, it has been found by experience to answer at least some of the important purposes of a first course of philosophical education. It is conducted upon principles, too, which, combining elementary instruction with active habits on the part of the student, seem to be strongly recommended by the most intelligent philosophers, both of ancient and modern times. "The business of education," observes Mr. Locke, "is not as I think, to perfect the learner in any of the sciences, but to give his mind that freedom and disposition and those habits which may enable him to attain every part of knowledge, himself." The views which we endeavour to put in practice in a philosophic system of instruction, concur most perfectly with the sentiments, now expressed, of those great and enlightened minds.

It is somewhat difficult, in giving a prospectus of the business of clear and lucid explanations to the various capacities of learners, to draw the line between detailing too much and too little,—between a



tedious explanation of common subjects, and a mere skeleton of contents. But it must ever be remembered, that these essays were not written with a view of extending the boundaries of those sciences from which these materials are taken: on the contrary, they are solely intended to afford some assistance in the way of acquiring knowledge and communicating it to others.

A teacher in qualifying himself to instruct young persons, must be supposed to have studied the several branches of knowledge, with a reference to this particular end; to have selected and adapted every topic which he introduces, with a strict regard to the capacity, and previous acquirements of his pupils, as well as the precise point to which he proposes to conduct them, in their progress through science. The teacher must be supposed to have read for his students, nearly as they might be imagined to read and think on the subjects which he is about to communicate to them; not, indeed, that he may thereby do their work for them, but that, on the contrary, he may occupy their time with the most important, the most suitable, and consequently, the most useful studies. In the prosecution of these objects it ought to be the aim of the teacher in every part of his instructions to lay before his pupils at the proper time, those particular elements of knowledge with which they ought to be first acquainted; to facilitate their progress towards more recondite subject of inquiry; to prevent all unnecessary loss of time and labour; to obviate all perplexity; to assist all their endeavours; and gradually to lead them into those paths which will guide them with ease and certainty to a still higher degree of scientific attainment. In addition to what has been said, the teacher will occasionally find it useful to comprehend, in his elementary discourses, particularly when his subject naturally suggests them, such literary incidents or anecdotes as may, at once, seem calculated to extend information, and to create a lively interest in the minds of the students; for, in this way, he will render knowledge agreeable, from the manner in which it is conveyed and highly efficient from the powerful motive which it can hardly fail to inspire.

The practice, however, of loading students down with books beyond their capacities to comprehend, and of dictating to them in the same language, give a mysterious semblance of learning, to every thing which is taught; and contributes not a little, we may suppose, to conceal from common observation, and even from teachers themselves, the intrinsic defects of the system which they pursue.—New methods of teaching, particularly when directed to new objects of study, necessarily require fresh efforts on the part of the teacher; new lectures, and new books and systems, also require additional exertions, but teachers are from a natural indolence, willing to persuade themselves that their own methods are the best, and their views are powerfully seconded, from

without, by a numerous body of men, who deprecate any alteration whatever in established usages. But, although these defects are clearly pointed out, and although inventions and discoveries, arising from the improved methods of teaching, are multiplied on every hand, yet neither example nor success on the minds of those who are wedded to their own antiquated notions, can effect any influence, nor produce any alteration in their modes of teaching.—In general, the dependant teachers and the richest and best endowed societies are the slowest in adapting those improvements, and the most adverse to admit any considerable change in the established forms of education. Improvements are more easily introduced into places of education, in which the teachers, depending upon their own reputation for the greatest part of their subsistence, are obliged to pay attention to the current opinions of the world.

When the primary object of a teacher is not so much to extend the bounds of science, by original speculations of his own, as to communicate to youth elementary instruction, drawn from the works of others, he will not find much difficulty in making himself sufficiently master of all that is necessary to be taught in our schools, whilst, from an intercourse with his pupils, he will have such an opportunity of becoming acquainted with their several talents and dispositions, and enable him to adopt, with every prospect of success, his mode of instruction to their respective capacities.

It seems not to have occurred to the scholastic philosopher, that the intellectual powers of man can only be successfully cultivated by a system of discipline which applies to the whole; for that, as these powers grow up together, in the closest connexion and affinity, so, in their progress towards perfection, they afford to one another an increased degree of strength and mutual assistance. The faculty of memory, for example, is improved by whatever tends to produce habits of attention; and the faculty of combination and inference is rendered more certain and vigorous in its operations, by the previous culture of those inferior powers of intellect, whose office it is to observe, or define, and to arrange the materials of knowledge, than it could be done, by any artificial rules, applied directly to that faculty itself. But the great object of philosophical education should be to supply the means of cultivation, not to one faculty only, but, to a certain extent, at least, to all the powers of intellect and taste; to call them severally into action; to present appropriate subjects for their exercise; to watch over their movements and direct their expanding energies; so as to maintain them in that just relation to each other, and to secure that reciprocal aid, in their progressive improvement, which seems pointed out to us by the order of nature itself. For youth, destined to fill various, and very different situations in life, the course of instruction ought not certainly to be limited to the



narrow range, generally pursued, in our schools, academies and even in some of our colleges, but, on the contrary, should be made to comprehend the elements of those other branches of knowledge, upon which the investigation of science and the successful dispatch of business, are found chiefly to depend.

But the evil of persisting in the system of teaching, which is strenuously adhered to, by the disciples of the old school is not confined to the mere loss of time, and to the sacrifice of useful knowledge which might otherwise be acquired by the juvenile student. The effect is of a more pernicious nature; for, to require the regular attendance of youth six hours every day, during six or seven years to repeat over by heart, book lessons and abstract definitions; and to listen to terms they cannot understand, and in which, of course, they can take no interest, has a direct tendency to produce habits of negligence, indifference and inattention; which, it is well known, terminate but too frequently in positive and rooted aversion to study of every description.

The system of instruction best calculated for intellectual improvement in our schools consists of two parts: the first, comprehending a course of simple explanatory lectures delivered daily, on such subjects as seem best suited to the age, habits, and actual attainments of the pupils; the second comprising a daily examination of the pupils, on the subjects presented to their understandings, accompanied by prescribing, reading, and correcting a progressive course of themes or exercises, founded chiefly on the lessons of oral instruction or lectures, and executed by every individual in the class. The details of this latter division of the business will be set forth, at considerable length, in a subsequent part of our journal.

In the present number we remark, that by enlivening our lessons by introducing a variety of notices and anecdotes, well calculated to make an impression on youthful minds; to invigorate their faculties by the constant exercise of them;—to suggest subjects for future inquiry—and, above all, to supply materials for executing the lessons, which agreeably to the plan of instruction and discipline established in the class, are regularly prescribed and exacted.—In selecting notices, too, particular attention is paid to such as will illustrate the progress of the humane faculties, under the education of nature, whether it respects rude nations, or the condition of early childhood among ourselves. Such subjects are well suited to the comprehension, even of the youngest student. These observations ought on all hands to tend to the study of human nature in every stage and degree of advancement. A child thus, becomes an instructive companion to the young philosophic teacher. He beholds, in the gradual opening of the infant faculties, propensities, and desires, the best natural history of mind; he perceives, in the first play of ima-

gination, and in the first attempts at reasoning, the profusions of those brilliant powers, which charm the world in the poet, and instruct it in the man of science.

*For the Academician.*

PESTALOZZI,

NO. IV.

THE elementary principles of linear drawing, are of so much more moment than may be at first imagined by those who have not strictly analyzed the multitude and variety of forms and uses in which that knowledge requires to be well possessed, that I shall give you several brief specimens of the modes by which this knowledge is developed, and established by habit in the mind, and in practice in the hand.

*Teacher.* Let us see how far we have profited by our previous exercises in the properties of lines, and their execution. [He points to a table or large board affixed to the end of the room in front of the boys, on which such lines are drawn, as were described in No. III.] What denomination did we give those lines on the left?

*Pupil.* We called them horizontal lines, or strokes.

*T.* We shall for simplicity's sake call them lines,—those strokes we call horizontal lines.

*P.* [The pupils repeat after him.] Those strokes we call lines.

*T.* But what would you call those strokes on the right?

*P.* We call them vertical lines.

*T.* Why do you call them vertical?

*P.* What is meant by vertical, I only know by recollecting that they were so called, or that they were perpendicular, or erect, or upright.

*T.* Then you know the fact, only because you heard it so said?

*P.* I have an idea of what I see, but the meaning of the word otherwise I do not know.

*T.* The word ought to be understood. It is derived from the *vertex* or point immediately over your head, as you look up to the heavens;—perpendicular is of the same meaning, only it is otherwise derived; for example, if you suspend a weight to the end of a cord, and let it hang from your hand, the line formed between the hand and the cord, is a perpendicular line; if you place a straight stick in the same position as the cord, it is one erect line, because it is set up or erected, and hanging; so upright, means that from the lower end of the stick, it is right up to the other end. You understand that in regard to lines drawn, the several terms mean the same idea.

*P.* Clearly so sir.

*T.* Do you not perceive other circumstances that relate to those lines?



P. No sir.

T. Do you know how many lines there are in either of these drawings of lines?

P. No sir.

T. How shall we proceed to find out?

P. Perhaps, I do not understand you properly.

T. If you had a handful of chestnuts, how would you ascertain the number?

P. By counting them.

T. Then what must you do to find the number of lines?

P. Count them also.

T. Come let us see—repeat after me as I count—one time one line—two times one line—three times one line—four times one line [so on to ten times one line and they repeat.] So that as we employ time in each enumeration, we substitute the word time for the thing; and say so many times, as we count things: now, how many vertical lines on the right?

P. The like number, ten lines, ten times one line.

T. But you seem to guess at it; you must not trust to guessing when counting is in question; let us count these also, and then we shall be sure [here he counts in the same way as before.] Well, we know now how many lines there are; but we have much to say and learn about those lines, or I am mistaken, and it is proper when we talk about things, that we should not be ignorant of what we talk about. Now, if there are any two of those lines that have a property or want a property which another has got, we must find out how to express ourselves, so that when we speak we shall be understood. [Board being suspended perpendicularly in front, the teacher takes a verge or a slender rod, for the purpose of pointing therewith to any of the lines on that board; or he selects one of the class, and every one of them in turn, to do so. He points with the verge to the uppermost horizontal line and says.]

T. Repeat after me:—This is the first line—

P. This is the first line.

T. This is the second line.

P. This is the third line.

and he points, and they all repeat after him each line to the bottom.

[The horizontal lines being thus enumerated, he begins with the shortest vertical line and so proceeds to the tenth; and explains to them, that this is an exemplification of their position in relation to number and place, and are called *ordinal* numbers; for one, two, &c. have no reference to order, any more than 3, 2, 1; but first, second, third, &c. convey an idea of place or position. This explanation is also given in colloquy]

T. We have now contrived to understand each other as to the place and order of our lines; have you any idea of crooked lines?

P. Yes, certainly.

T. What kind of a line is this, (pointing to one of the lines on the table) is it a crooked line?

P. No; it is a straight line.

T. The second too?

P. Is a straight line [and so they say of each of the lines as before to the tenth.]

T. We have acquired some ideas of those lines; may we not discover some other properties—let us try—you all understand, I suppose, what it is to go up hill, or to go down hill?

P. You take care to let us know that in our morning walks.

T. What? you are tired when you go up hill?

P. That I am often, when I walk with you.

T. Well, here we are on the plane floor; do you go up or down on this floor?

P. We walk on it.

T. You do not *ascend* nor *descend*?

P. No, it is all level.

T. But suppose this floor was an inclined plane, or that it lay in the same direction as this sloped verge does, when you go from this point [pointing to the lower end of the verge,] to this point [the upper,] do you ascend or descend?

P. I ascend, certainly.

T. If you, John were at this end [pointing to the upper] and were to go to the end [the lower] would you then ascend also?

P. No: I should descend.

T. But; Edward, how do you understand ascending?

P. I understand going up hill, climbing a tree or a ladder to be ascending.

T. And you, James understand by ascending, to go down a hill?

P. By no means, sir; you thought I was not attending, and wished to catch me; but I attend to every word you say.

T. I am glad to find it—for you have guessed my intention.—

T. Then what do you understand by descending?

P. I understand by it, going down hill.

T. [Holding his verge on a horizontal line] does this verge form an ascending or descending line?

P. Neither one nor the other.

T. [He points to the horizontal lines on the table] but does not some one of these ten lines, ascend or descend?

P. No, not one.

T. Are you sure now, that none of them ascend or descend?

P. Unless our eyes deceive us, they are all horizontal lines.

T. Well then, since that must be the case, repeat after me—The first line neither ascends nor descends [they repeat.]

T. The second line neither ascends nor descends. [and so he says and they repeat to the tenth line.]

T. But what say you to those vertical lines [pointing at the first] does this line ascend or descend?

P. That first line is vertical or perpendicular; it is a line that is not to be ascended like a hill, or a tree—it is merely a straight upright line.



T. Then the second is also an erect line? [and so on, to the ten, they repeating.]

P. Do you know what is meant by the word slope?

P. The side of the hills we go over, slope.

T. Do you know what I meant, when I said an inclined plane?

P. You mean a sloping plane—this desk is a sloping plane.

T. What is meant by inclining?

P. The same as sloping to be sure.

T. What is the position of my stick now? [he slopes it.]

P. It inclines or slopes.

T. But now does it slope [the highest end being before on the right, is now brought to the left, and then backward and forward?]

P. It inclined first from right to left; now it is from left to right.

T. And now—and now?

P. Is sloped forward first—and now slopes or inclines backward.

T. [He now turns to the vertical lines on the table again] you see that none of these lines incline to the right or the left; does the first line incline?

P. No.

T. Then repeat after me; the first line inclines neither to the right nor left, the first line inclines neither backward nor forward. [they repeat after him and so to the tenth line.]

T. But why do you call this first line a horizontal line? [pointing to the first horizontal line of the ten.]

P. Because it neither ascends nor descends.

T. Why do you call the second line horizontal?

P. Because it neither ascends nor descends [so they repeat to the tenth.]

T. But why do you call this first line vertical? [pointing to it]

P. Because it neither inclines to the right nor left.

T. And the second is called a vertical line, &c. [so continue to the tenth.]

T. But what do you call the first horizontal line?

P. A straight line—all those lines are horizontal and straight.

T. And are not those also [the vertical] horizontal and straight?

P. They are straight but not horizontal; they are straight and vertical; but you thought to catch us again.

T. Suppose now we draw some lines.

P. Let us prepare our slates and pencils.

T. Are you all ready?

P. All.

T. What are we about to do now?

P. As you please—lines horizontal or vertical.

T. I draw my first horizontal, equal to three inches.

P. [Pupils all repeat and execute—and the lengths

of the lines are arbitrary; but they commence and run parallel with each other.]

T. Let us now draw vertical lines, are you all ready? At one inch from the upper frame and from the side frame, I commence my first vertical line, which I draw descending to the length of one inch.

P. [Repeat and execute.]

T. What have we done? [to a boy who appears inattentive.]

P. I have from the initial point at the distance of one inch from the upper and side frame of my slate, drawn a vertical line of the length of one inch.

T. On the right side of my first vertical line, and at the distance of one inch, I commence at the same summit my second vertical line, and I draw it descending two inches and one half an inch.

P. [Repeat and execute.]

T. At the distance of one inch and a half, on the right side of my second vertical line, I draw my third vertical line; of the length of five inches and three fourths of an inch.

P. [They repeat and execute.]

All these exercises are checked by the square, compass, and rule. The dexterity and proficiency acquired by these means, and the enlargement of the faculties, the self respect, which augments with, the acquirement of knowledge, and the obvious superiority of the subjects, compared with the studies of those of the same age in the ordinary schools, give this method a decided preference. Although there is a great variety of experiments on lines performed before they attempt angles, I shall here introduce an exercise on the angle; in order to diversify these sketches, which are after all, imperfect.

T. You see that figure? [pointing at it on the prepared table suspended in front—this is the figure,



P. I see two lines.

T. One of these lines is a vertical line, the other an oblique line.

P. [Pupils repeat.]

T. This vertical line is shorter than the oblique line.

P. [They repeat, all the following sentences.]

T. The oblique line is longer than the vertical line. The oblique line is a line sloped, and inclining from its summit to its lower point; and is inclined upwards from its lowest point to the summit;—this oblique line inclines to the right.

The vertical line meets the oblique line at one point.

The oblique line meets the vertical line at one point. These two straight lines meet each other at one point.



The final point of the vertical line, coincides with the point of the oblique line.

The final point of the oblique line, coincides with the final point of the vertical line.

The two meeting lines comprehend a space which is called an angle.

As this angle is formed by lines, it is said to be a linear angle.

This angle is said to be a line or angle because it is formed by lines.

This linear angle is formed by straight lines.

As this line or angle is formed by straight lines, it is said to be a rectilinear angle.

This line or angle is said to be a rectilinear angle, because it is formed by straight lines.

The straight lines which form this rectilinear angle, are called the limbs of this rectilinear angle.

This rectilinear angle is formed by two straight lines, and consequently has two limbs.

One of the two limbs of this rectilinear angle, is a vertical line, the other is an oblique line.

The vertical is the vertical limb of this rectilinear angle.

The oblique line is the oblique limb of this rectilinear angle.

The point in which the two limbs of this rectilinear angle meet, is called the summit of this rectilinear angle.

The oblique limb of this rectilinear angle, ascends from the left to the right, and descends from the right to the left.

The oblique limb of this rectilinear angle, considered from its initial point, inclines to the right.

The limbs of this rectilinear angle incline towards each other.

As the limbs of this rectilinear angle incline towards each other, they are not perpendicular to each other.

As the limbs of this rectilinear angle are not perpendicular to each other, it is not a right angle.

This rectilinear angle is not a right angle, because its limbs are not perpendicular to each other.

As this rectilinear angle is not a right angle, it is said to be an oblique angle.

This rectilinear angle is said to be an oblique angle, because it is not a right angle.

This oblique angle is smaller than a right angle.

As this oblique angle is smaller than a right angle, it is said to be an acute angle.

This oblique angle is said to be an acute angle, because it is smaller than a right angle.

The initial point of the vertical limb, and the initial point of the oblique limb, are not equidistant from the summit of that angle.

All these exercises thus repeated, transposed and varied in explanation of their properties, habituate the mind to the minute examination of the properties of other things; while ideas are imbibed with the same care as nonsense is acquired at other schools.

The analysis of angles and figures of every form, are made in the same manner, and to such perfection is this exercise of the eye, ear and hand carried; that any forms whatever may be exactly drawn by every pupil, without any other aid than the oral description.

## PHILOLOGICAL DEPARTMENT.

GRAMMAR. Continued from page 270.

THE infinitive mood resembles the noun in being used as a nominative to a verb; as in the following Latin sentence from Cicero, as well as in the translation of it into English: *Loquor de docto homine et erudito, cui VIVERE est COGITARE*. "I speak of a man of learning and erudition, for whom to live is to think." It is also, like the noun, capable of being governed by an active verb; as *Oblitus est SCRIBERE*, "He has forgot to write." On some rare occasions in the Latin language, an adjective is employed to agree with it as with a noun. Thus Cicero says, *Cum VIVERE ipsum turpe sit nobis*; also, *Totum hoc displicet PHILOSOPHARI*. Persius says, *VELLE suum cuique est*. Petronius, *Méum INTELLIGERE nullâ pecuniâ vendit*. In these instances *vivere* is used in the same manner as *vita*; *velle* as *voluntas*; *philosophari* as *philosophatio*, if such a noun existed; and *intelligere* is used as *intellectum*, the accusative of the noun *intellectus*. Sometimes it is employed as the genitive of a noun; thus Cicero says, *Tempus est ABIRE*, a phrase equivalent to *tempus est abeundi*. Sometimes as an ablative. Thus in Plautus, *Ego sum defessum REPERIRE, vos defessi QUERERE*.

In other respects, however, it differs from the noun. The concordance of an adjective with it in the manner now mentioned is a rare occurrence even in the Latin language, and does not take place in the English and others. The additional idea which the adjective would express is connected with the infinitive by a different sort of syntax. In Latin, *meum intellectum*, or *meam intelligentiam*, is more consonant to general usage than *meum intelligere*. We should not in that language say *bonum intelligere*. If *bonus* were employed, it would be along with *intellectus*, or some other noun; and, if the infinitive *intelligere* were employed, the additional idea would be conjoined by means of a part of speech which we have not considered, the adverb; in this instance, *bené intelligere*. In English we should not say, "my to understand," but "my understanding;" nor "a good to understand," but "a good understanding," or "to understand well."

When an agent is mentioned along with an action in the infinitive, it is not in the form of a noun in the genitive, as it would be if the act were expressed by a noun. We do not say *illius amare*, as we



should say *illius amor*. Nor is it put in the nominative. Though we say *ille amat*, we do not say *ille amare*. The syntax of the infinitive is in this instance peculiar; the agent is put in the accusative: *Illum amare*. This arrangement does not arise from the regimen of a preceding word expressed or understood governing the noun in the accusative. The combination of the noun in this form with the infinitive sometimes constitutes a phrase which is used as a nominative to a verb. In the Greek language this combination is sometimes even used as a noun in different oblique cases in which it has an adjective agreeing with it. Thus Anacreon says,

Σὺν τῷ δὲ ΠΙΝΕΙΝ ἩΜΑΕ

Εὐδαιμονία μεθύει.

The accusative here only intimates that the noun and the infinitive occupy the place of a subjoined sentence. In English, when the phrase is to be employed as a nominative to a verb, we use the noun preceded by the particle "for," which may be reckoned equivalent to an oblique case in Latin. We say, "for a man to tell a lie is a sign of cowardice." We sometimes find this differently expressed in low and provincial dialects. "To," for example, is employed instead of "for;" as, "To you to deceive me was unbecoming." At other times the noun in the objective case is used without any preposition, as, "But, him to think that he was entitled to any credit was ridiculous."

When an object acted on is mentioned in connection with an act expressed by the infinitive, or when the name of an object referred to, and usually governed by a verb in some oblique case, is introduced, it is not put in the genitive as when it follows a noun signifying the same action. In this respect the infinitive retains the regimen of the verb to which it belongs. We say *amor uxoris*, for, "the love of one's wife," or, if the person entertaining this affection is already mentioned in the genitive, the object of it is introduced by a preposition in such a phrase as *amor illius erga uxorem*. But when the infinitive *amare* is used, it governs *uxorem*, in the accusative. We say, *Illum amare uxorem*, "for him to love his wife." Sometimes an ambiguity might thus be created, because both the agent and the object are mentioned in the same case, and, on account of the common practice of inversion in the Latin language, the order in which the words are placed does not strictly follow that of their syntax. Hence the ambiguity of the famous response of the Pythian oracle to Pyrrhus, *Aio te Romanos vincere posse*, which admits of being translated, "I say that you can overcome the Romans," or, "I say that the Romans can overcome you." In general, however, the connection renders the meaning of such sentences evident, and their perspicuity is assisted by the name of the agent being placed before the infinitive, or nearest to it, while the accusative sig-

nifying the object acted on either comes after, or is at a greater distance before it. The same thing takes place in the English language, although in it the infinitive differs a little in its mode of information, as it consists of the prefixing of a separate word. When we use the noun "desire," we say, "the desire of food," "of money," or "of fame." But "to desire food, money, or fame." The production of this mode of transition seems to us to be the great power conferred on a noun by the word "to" prefixed as the sign of the infinitive. In this therefore, according to Mr. Tooke, the nature of a verb should consist. It might appear, however, that this is not common to all verbs, and therefore is not the characteristic circumstance which, when added to a noun, makes it a verb. In neuter and intransitive verbs it scarcely appears. Yet it is not always lost even in these. Every verb admits of a transition of discourse to some other ideas expressed by nouns, if not by direct regimen, yet through the medium of prepositions, and this is generally more or less altered when a word from being a noun receives either the form of assertion, so as to become a verb, or is transformed into that part of speech called the infinitive of the verb. Let us take, for example, the word "struggle," which is used both as a noun and as a verb. We say, "his struggles were strenuous and incessant." When we use it as a verb, we say, "he struggled with a powerful antagonist." We often also use such expressions as, "His struggles with his antagonist were obstinate." But in this last phrase we are conscious of a slight defect; and, although the brevity and manifest meaning of it may in general enable it to pass without censure, an accurate writer will prefer the introduction of a verb for the purpose of completing the series of words demanded by the syntax. It will be felt more strictly agreeable to the import of the different materials of language to say, "the struggles which he maintained with his antagonist were obstinate." It is also to be remembered, that even the least transitive verbs differ from nouns by having all qualifying ideas conjoined with them, not by adjectives but by adverbs, and that in this particular the infinitive mood follows the law of the verb; we say, "a violent struggle," but "to struggle violently." It is only in these peculiarities of transition, and in receiving adverbs instead of adjectives, that we can perceive any difference betwixt the infinitive of a verb and the corresponding noun. The former of these differences depends, in a great measure, on the character of particular verbs, and both of them seem too slight to confer on the infinitive the same rank with the asserting verb, and to divest it of the character of a noun. This is more especially the case when we consider that it is often used without an adverb, and without any such transition as has now been described, but is never independent of some character of syntax which is common to it.



with the noun. With this statement of the facts, we leave the argument to the consideration of our readers. We deprecate, in the mean time, any premature attempt to improve, in this or any other instance, the nomenclature of grammar.

The infinitive mood, in consequence of resembling in some particulars the noun, and in others the verb, is rendered fit for performing, in a manner peculiar to itself, the office of the subjunction of sentences to verbs. It may be made a question whether connections of words formed by means of it ought to be called sentences; but they certainly contain the meaning of sentences. We have already remarked that every noun may be resolved into a sentence, by means of a definition. But by the use of the infinitive we have the parts of the sentence in a more distinct state than if they were all implied in a noun, though not so explicitly as in a definition, or even in a sentence formed by the subjunctive mood. It has thus a character intermediate betwixt the noun, with its regimen of genitives or the accompaniment of adjectives, and such subjoined sentences as have been already described. The same connection of ideas may be expressed by any one of the three following modes of diction:

1. By nouns alone, as in this sentence, "he wishes his son's *departure*."

2. By the infinitive mood, as when we say, "he wishes his son *to depart*."

3. Or by a sentence subjoined in the subjunctive, thus, "he wishes *that his son would depart*."

Here the verb "to wish" is that to which the other ideas are subjoined; and the verb "to depart" is that which is variously implied in the subjoined series of words.

The preference of one of these to another will sometimes be dictated by convenience, according as the intention of a writer is to study brevity, or to indulge in minuteness of detail; and sometimes there will be so little foundation for any particular preference, that the choice will be left to fancy, to habit or to the love of variety. Sometimes a sentiment expressed in one of these modes in one language requires a different one when translated into another. *Crêdo te sapere* may be translated "I believe you to be wise;" but *dixi te sapere* cannot be translated "I said you to be wise; the infinitive is here to be laid aside, and instead of it, a sentence must be subjoined by means of the word "that." "I said that you were wise."

We generally find it more eligible to use an infinitive than a noun, when we have occasion to connect with the meaning of the word any considerable variety of circumstances. We say "murder is a heinous crime;" but when we mention the agent and the object, we prefer using the infinitive mood, we say, "for a son *to murder* a parent is a heinous crime." This is a more complete expression than "the murder of a parent by a son." Indeed this

last phrase evidently requires a verb or a participle to make it complete; thus, "the murder of a parent *committed* by a son, is a heinous crime; and, as this makes the phrase verbose and tedious, it is better to say, "for a son to murder a parent is a heinous crime." In the Latin language, this idea would be most conveniently expressed by the subjunctive mood preceded by the particle *ut*. *Ut filius parentem interficiat nefas est*. It is but seldom that the mention of the agent is combined with the use of the infinitive, when the combined phrase is to be made the nominative to a verb. Such expressions as *filium interficere parentem nefas est*, are sometimes used, but they are inconvenient and ungraceful, and therefore not common.

The infinitive mood is varied in respect of tense. That form which is called the present infinitive is in reality of no tense. It is pure, absolute, and aoristic. It may be employed without the implication of time, and it admits of being applied equally to past, present, and future transactions. The remarks which we have made on that part of the *indicative* mood called its present tense, will suggest sufficient proofs of this fact; and the subjects are so nearly analogous that it is unnecessary to bring forward particular illustrations of this point.

The infinitive in the past tense is, in the Latin language, fully expressed by the termination *isse*, which is nearly allied to the pluperfect subjunctive, a circumstance probably arising from the coincidence of their use as consisting in a subserviency to subjunction.

The future infinitive, both in Latin and in English, is formed by circumlocution. In Latin the general infinitive of the substantive verb is, for this purpose, conjoined with the future participle. *Iturum*, or *iturus esse*. In English it is constructed on similar principles. We say "to be about to go." We sometimes merely use the general aoristic infinitive after a verb which implies a reference to futurity, as "I expect him to go." In expressing such ideas, however, we frequently reject the infinitive as not well fitted for our purpose, and in its stead employ a sentence in the future indicative, subjoined by the word "that;" "as I expect that he will go."

Similar principles are discovered in the formation of the tenses of the infinitive in the passive voice.

#### 6. The Gerund and Supine.

THE *Gerund* is a part of speech nearly resembling the infinitive, but tending more strongly to the noun, both in form and syntax. Like the noun, it is governed by prepositions, which the infinitive, at least in the Latin and English languages, is not. We say "much harm is done to the constitution *by drinking*." In Latin this idea is expressed by the ablative of the gerund (*potando*.) The infinitive is sometimes thus



used without a preposition, as in a passage already quoted from Plautus, *Ego sum defessus reperire, vos defessi querere*; but the gerund is, in almost every instance, better adapted to such purposes. Such passages contribute to show to what extent the infinitive may be used as a noun; but the infrequency of that mode of employing it, and the frequent use of the gerund, prove to us that differences in the forms of words, or parts of speech, often consist in a different extent of adaptation to particular purposes, and that the characters of some pass almost insensibly into those of others.

The gerund differs from the infinitive in not admitting the mention of the agent in equally close syntax. It does not even, like the noun, admit of the annexation of this or any other idea by a genitive or an adjective, nor has it any power analogous to that which the infinitive has of taking an accusative before it, to signify the agent. The gerund therefore is employed only when no mention of the agent is required, or when this is done by connecting it with some other word in the sentence, as when we say "*men hurt themselves by drinking.*"

The gerund takes the regimen of the verb with respect to the nouns which it introduces. In Latin we say *potando vinum*; and in English, "by drinking wine." The same word may however be also used as a noun, and then it may take an adjective and govern the genitive; as "by *the drinking of wine.*" The difference betwixt the word in "ing," in these two modes of employing it, is analagous to the difference betwixt the Latin gerund in *dum*, and the noun in *-tas* or in *atio* or *itio*, formed from the verb. Instead of the preceding phrase, we may employ *potu*, or *potatione vini*. The Latin word called the gerund also admits of being used as a noun; we can say *potando vini*, as well as *potando vinum*.

The gerunds now mentioned have no accident of tense conjoined with them. We formerly observed, however, that the preterite-form of the English verb, as used after the auxiliary "to have," has the nature of a preterite gerund. "Gone" is the name of an act completed. In the phrase "I have gone," it occupies the place of a noun governed in the accusative. In verbs of the transitive kind, while it is thus governed, it governs in its turn another noun, in the same manner as the other parts of the verb to which it belongs. We say "I have *given* them my promise." This is the nature of the word separately considered; but it is never used as a gerund in any other connection, and therefore grammarians have neglected to ascertain its proper character.

The word called a *supine* in the Latin language is, in structure and use, similar to the gerund, though not possessing all its inflections, and more limited in its application.

### SECT. XII. Interrogation.

INTERROGATION is a part of the object of language,

performed by means of the verb, which remains to be considered. We have mentioned it in enumerating the forms of imperative influence which mankind, by means of language, exert on one another. Its peculiar object is, to obtain information from the person addressed. Mr Harris considers it as a modification of the use of the verb, and constituting a distinct mood, although the verb when thus applied should not possess a distinct form. It is a direct request, and therefore implies the imperative in a very prominent degree. "What is your name?" is another mode of saying "tell me your name." Interrogative words and interrogative arrangements of words are abbreviations implying the subaudition of the imperative of the verb "to tell." "Who is there?" means "tell me the person who is there."

Interrogative words implying a request for the particular mention of one circumstance that must be selected as true, from many others that are imaginable, have a close etymological connection with the relative, and sometimes consist of it unaltered. *Quis* in Latin is different from *qui*, but is evidently derived from it, and the variation which it receives is intended to intimate that the imperative of the verb "to tell" is understood; or rather it is so altered as to express this imperative distinctly and fully. In the Italian language, we have an instance of the employment of a different sort of word; "what do you want?" is expressed by *cosa volete?* which literally translated is "thing you want." But on most other occasions, in every language, the interrogative words are more or less allied to the relative. From *qui* in Latin, we have *quis? qualis? quando? quo? quorsum?* and from "who," and "which," in English, the words "when?" "where?" and "whence?" are evidently derived.

There are other questions which may be denominated *alternative* in their nature, because the speaker supposes two opposite statements, one of which must be true and the other false. A subject and a predicate are connected in a question, and the only reply that it admits of is, either an assertion of a connection betwixt the subject and this predicate, or betwixt it and a predicate which is completely the reverse. This may be also done by single words of affirmation or negation, rendered completely significant by their reference to the question. Interrogations of all kinds, however, imply the meaning of the imperative of the verb "to tell." The words of which they consist are a sort of subjoined sentences to this imperative, and are in some degree elliptical in the first creation, though generally rendered precise by receiving a peculiar form.

### CHAP. VII.

#### Of Adverbs.

THE term *Adverb* is considered by Mr. TOOKE as expressive of no character by which a part of speech



can be distinguished. He considers the adoption of it as an artifice by means of which, under the colour of scientific order, grammarians have brought together a variety of words, originating in abbreviations and corruptions, and possessing in no other respect any common property. In this opinion we cannot acquiesce, although we are sensible that some confusion has arisen from the unskillfulness of grammarians in ranking among adverbs some words which ought to have been included under a different head.

*To be Continued.*

## ARITHMETICAL AND MATHEMATICAL DEPARTMENT.

### OF FRACTIONS.

*Continued from page 236.*

THE first conclusion to be drawn from the foregoing table, is that operations performed upon the denominator, produce the effect of contrary or inverse operations upon the quantity represented by the fraction. *A farther result is, that, if the numerator and denominator of a fraction be multiplied at the same time by the same number, the value of the fraction will not be changed:* for if, on the one hand, the fraction is increased to 2, 3, &c. times its former value by multiplying the numerator; on the other, a half, a third, &c. part of it is taken by the second operation; in a word, it is divided by the same number by which it was multiplied at first. Thus 1-5 is equal to 3-15, and 5-21 are equal to 10-42.

It may be seen in the same manner, that *if the numerator and denominator of a fraction be divided at the same time by the same number, the value of the fraction will not be changed;* for if, on the one hand, by the division of the numerator, the fraction be made 2, 3, &c. times less than before; on the other, by the second operation, it is increased to 2, 3, &c. times its former value, in a word it is multiplied by the same number by which it was before divided. Thus, the fraction 2-4 is equal to 1-2, and 3-9 is equal to 1-3.

It is not with fractions as with whole numbers, in which a quantity, as long as it retains its relation to the same unit, is susceptible of but a single expression; by fractions, on the contrary, the same quantity may be expressed in an unlimited number of ways. For example, all the fractions 1-2, 2-4, 3-6, 4-8, 5-10, 6-12, 7-14, &c. in which each numerator is contained twice in its denominator, express, under different forms, the half of the unit. The fractions 1-3, 2-6, 3-9, 4-12, 5-15, 6-18, 7-21, &c. in which each numerator is contained 3 times in its denominator, all represent the third part of the unit. But among all the forms taken in each example by the fraction proposed, the first is the most remarkable,

as being the most simple; and it would accordingly be well to know how to return to it from each of the others; now this may be accomplished by dividing the two terms of any one of them by the same number, which, as has been shown, will not alter its value. Thus, on dividing the two terms of the fraction 7-14 by 7, we come back to 1-2, and by performing the same operation upon the fraction 7-21, we deduce from it 1-3.

By following this last proceeding, a fraction may be reduced to its lowest terms, or to its *simplest expression*. It can be applied to no fractions but those of which the numerator and denominator are divisible by the same number; and in all other cases, the proposed fraction is the simplest of all that can represent the quantity which it expresses.

Thus, the fractions 5-7, 7-12, 15-16, of which the terms cannot be divided by the same number, or which have no common divisor or common measure, are *irreducible*; and, consequently, the quantities which they represent, cannot be expressed in a more simple manner.

From this it may be understood, that in order to simplify a fraction, we must try to divide both its terms by some one of the numbers 2, 3, &c. but by this trial we may not always reach the simplest expression of the proposed fraction, or at least, we may frequently be compelled to make many unsuccessful attempts. If, for example, we had the fraction 24-84 given, we might observe first, that each of its terms is a multiple of 2, and, after dividing them by this number, we should obtain 12-42, dividing then the two terms of this last by 2, we have 6-21; this fraction, notwithstanding that it is already much more simple than the given fraction, is still susceptible of a farther reduction; for both of its terms may be divided by 3, and thus we have 2-7.

If it be remarked, that to divide a given number by 2, then to divide the quotient by 2, and then this new quotient again by 3, are the same as to divide the number at once by the product of the numbers 2, 2 and 3, which are equal to 12, it will be seen that the three operations above may be effected at once, by dividing the two terms of the proposed fraction by 12, when we have likewise 2-7 as before.

The numbers 2, 3, 4 and 12, since they each divide at once the numbers 24 and 84, are the common divisors of these numbers; but 12 is distinguished from the others by being the greatest; and by employing *this greatest common divisor or common measure* of the two terms of the given fraction, we reduced it at once to its simplest expression. There would be great use then in such an investigation as this: *Two numbers being given to find their greatest common divisor.*

The common divisor of two numbers may be found by a species of trial easy in its application, which has the advantage of coming nearer to its conclusion at each attempt. This may be clearly understood



from the following example. Let the two numbers be 637 and 143. The greatest divisor common to both these numbers, evidently cannot be greater than the smaller of the two; it is worth while then to try whether the number 143, which divides itself and gives 1 for the quotient, will also divide the number 637, in which case it will itself be the greatest common divisor sought: but, in the example proposed, it is not so, for we have quotient 4, and a remainder 65.

Now it is plain that every divisor common to the two numbers 637 and 143, must also divide the number 65 which remains after dividing the greater by the less; for the greater 637, is equal to the less 143, multiplied by the quotient 4, plus the remainder 65; but on dividing 637 by the common divisor sought, we shall have an exact quotient; we must also then have a like exact quotient; on dividing by the same divisor each of the parts into which 637 is separated, and putting together the results; but the product of 143 by 4 must necessarily be divisible by the common divisor which is a factor of 143, then the other part 65 must also be divisible by this divisor, without which the entire quotient would be a whole number accompanied by a fraction, and consequently could not be equal to the whole number resulting from the division of 637 by the common divisor. Thus, every divisor common to 65 and 143 will divide 637, composed of 4 times 143 and 65.

By the same reasoning, it may be proved in general, that every divisor common to two numbers must divide the remainder of the division of the greater by the less; and, that every divisor common to the less number and the remainder, must divide the greater.

From this principle, it may be concluded that the greatest common divisor of the numbers 637 and 143, will likewise be that of the numbers 143 and 65, and that the greatest common divisor of these last, will likewise be that of 637 and 143; but, as 65 cannot be divided by a number greater than itself, the first trial must be made by that. On dividing 143 by 65, we get three for the quotient, and 13 for the remainder. From a course of reasoning similar to that in relation to the numbers 637, 143, and the remainder 65 of their division, it will appear that the greatest common divisor of 143 and 65, will likewise be that of the numbers 65 and 13: now, the greatest divisor common to these last cannot exceed 13: it must then be tried whether 13 will divide 65, which it will, and 5 is the quotient. Therefore 13 is the greatest common divisor sought, since being the greatest divisor common to itself and 65, it must be the same to 65 and 143, and being the greatest divisor common to these numbers, it must be the same to 143 and 637.

It is convenient in practice to place the successive divisions in course after each other, and to dispose the operation as follows:\*

\* In the French method, the products are not set down, but the operation exhibits the dividends, quotients, and

$$143)637(4$$

$$572$$

$$65)143(2$$

$$130$$

Greatest common measure 13)65(5

$$65$$

$$0$$

As the reasonings employed in the foregoing example may be applied to any numbers whatever, they lead to this general rule: *The greatest common measure or divisor of two numbers may be found, by dividing the greater of the two numbers by the less; then dividing the less by the remainder of the first division, then dividing this remainder by that of the second division, then dividing this second remainder by the third remainder or that of the third division, and continuing thus to divide the remainder of each operation by that of the following, until an exact quotient be obtained. The last divisor will be the greatest common divisor sought.*

These two examples will be sufficient for the explanation of the operation.

## COMMON METHOD.

$$3760)9024(2$$

$$7520$$

$$1504)3760(2$$

$$3008$$

$$752)1504(2$$

$$1504$$

$$000$$

## FRENCH METHOD.

$$9024)3760)1504)752$$

$$2 \quad 2 \quad 2$$

$$1504 \quad 752 \quad 000$$

The greatest common divisor then of 9024 and 5760, is 752.

$$47)937(19$$

$$47$$

$$467$$

$$423$$

$$44)47(1$$

$$44$$

$$3)44(14$$

$$42$$

$$2)3(1$$

$$2$$

$$1)2(2$$

$$2$$

$$0$$

937	47	44	3	2	1
467	19	1	14	1	2
44	3	14	1	0	
		2			

It may be seen in this last operation that the greatest divisor common to 937 and 47 is only 1, that is to say, that properly speaking, these two numbers have no remainders, which become divisors in succession. The following is an example of it:

637	143	65	13
	4	1	5
65	13	0	



common divisor, since all whole numbers are divisible by 1.

The preceding rule will always lead to this result, whenever the numbers proposed have no common divisor; for the remainders being always less than the divisors, become less and less at each operation; and it is plain that the divisions will be continued as long as there is a divisor greater than unit.

According to these calculations, the fractions 143-637, 3760-9024, may be reduced at once to their lowest terms, by dividing the two terms of the first by their common divisor 13, and those of the second by their common divisor 752: thus they are found to be equal to 11-49, 5-12. As to the fraction 47-937, it is absolutely irreducible, since its two terms have no other common measure than unit.

It is not always necessary to attempt the search of the greatest divisor common to the two terms of the proposed fraction; some reductions, as we have before shown, offer themselves so readily as to make this investigation unnecessary.

Every number terminated by one of the figures 0, 2, 4, 6, 8, is divisible by 2; for since, after dividing any number by 2, the remainder of the tens can never be greater than 1, the last partial division will be performed upon the numbers 0, 2, 4, 6, 8, if the tens have left no remainder, or upon the numbers 10, 12, 14, 16, 18, if they have left one, and all these numbers are divisible by 2.

The numbers divisible by 2, are called *even numbers*, because they may be divided into two equal or even parts.

In the same manner, every number terminated on the right by 0 or by 5, is divisible by 5; for, after having reached the division of the tens by 5, the remainder, if there be any, must necessarily be 1, 2, 3, or 4 tens; so that, if the last figure be an 0 or 5, the operation will be finished upon one of the numbers 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, which are all divisible by 5.

The numbers 10, 100, 1000, &c. being expressed by the unit followed by a certain number of cyphers, may be decomposed into 9 plus 1, 99 plus 1, 999 plus 1, and so on in succession; and the numbers 9, 99, 999 etc. being divisible by 3 and by 9, it follows that if numbers of the form 10, 100, 1000, &c. be divided by 3 or by 9, the remainder of the division will be 1.

Now every number, which like 20, 300, 5000 is expressed by a single significant figure, followed on the right by a certain number of cyphers, may be decomposed into several numbers expressed by the unit followed on the right by the same number of cyphers: 20 is equal to 10 plus 10; 300 to 100 plus 100 plus 100; 5000 to 1000 plus 1000 plus 1000 plus 1000 and so on with respect to others. It follows from this, that if 20, or 10 plus 10, be divided by 3 or by 9, the remainder will be 1 plus 1 or 2; and if 300, or 100 plus 100 plus 100, be divided by 3 or by 9, the remainder will be 1 plus 1 plus 1, or 3.

Generally then, if we decompose in the same manner, any significant figure, followed on the right by a certain number of cyphers, in order to divide it by 3 or by 9, the remainder of this division will be equal to as many times 1 as there are units in the significant figure, that is to say, to the significant figure itself. Now, any number whatever, being decomposed into units, tens, hundreds, &c. will be found to consist of several numbers, each expressed by a single significant figure, united together; and if each of these last numbers be divided by 3 or by 9, we shall have one of the significant figures of the proposed number for a remainder: for example, the division of the hundreds will give for a remainder the figure of the hundreds, the division of the tens, that of the tens, and so on with all others. If then, the sum of all these remainders be divisible by 3 or by 9, the division of the proposed number may be exactly completed; whence it follows that if the sum of the figures of any number be divisible by 3 or by 9 it will be the same with the number itself.

Thus, the numbers 423, 4251, 15342, are divisible by 3, because the sum of the significant figures is 9 in the first, 12 in the second, and 15 in the third. In the same manner, 621, 8280, 934218, are divisible by 9, because the sum of the significant figures is 9 in the first, 18 in the second, and 27 in the third.

It will be remarked that every number divisible by 9 is therefore also divisible by 3, although every number divisible by 3 is not so by 9.

Observations analogous to these might be made upon several other numbers; but the investigation of these properties would be a departure from our subject.

The numbers 1, 2, 3, 5, 7, 11, 13, 17, &c. which can only be divided by themselves or by unit, are called *prime numbers*. Two numbers, as 12 and 35, having each its separate divisors, none of which are common to both the numbers, are called *prime to each other*.

An irreducible fraction has consequently for its numerator and denominator, numbers which are *prime to each other*.

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